Space Weather Forecast

Issued on Sunday, 31 October 2021 at 12:28 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: CME arrival still possible day 1 (31st) with G1/G2 Minor to Moderate storms likely and a chance of isolated G3 Strong Storm. G3 Watch issued.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity was low, with a number of common-class flares detected. There are currently four sunspot regions visible, the most complex of which is in the northeast disc, with a recent (31/0706 UTC) common class flare which produced a coronal mass ejection. This is awaiting further imagery for analysis. No further Earth-directed coronal mass ejections (CMEs) were seen.

Solar Wind / Geomagnetic Activity: The solar wind speed started at background, but gradually increased to slighly elevated by the end of the period. The interplanetary magnetic field was weak at first but increased to moderate levels on two occasions, between 30/1530-2130 UTC then again after 31/0915 UTC. The important north-south component, Bz also increased from background levels to be moderately negative (southward) between 30/1930-2300 UTC and again after 31/1030 UTC. These parameters indicate the potential of two weak CME's passing Earth, one late on 30th UTC and one after 0915 UTC on the 31st. Both are notably weaker than the anticipated CME arrival. Resultant geomagnetic activity was Quiet to unsettled (Kp0-3).

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) decreased from Minor storm levels to be just below by 30/2200 UTC.

Four-Day Space Weather Forecast Summary

Solar Activity: Low solar activity is forecast with a slight chance of moderate-class flares, most likely from the sunspot in the northeast disc.

Solar Wind / Geomagnetic Activity: A large CME from the strong flare on the 28th has yet to arrive at Earth, and may still during day 1 (31st), though are some recent indications of elevated activity in the solar wind parameters. Geomagnetic activity is expected increase to give Minor to Moderate geomagnetic storms, with a likelihood of isolated Strong storms. Geomagnetic activity is then expected to gradually subside day 2 and 3 (1st and 2nd) with an eventual return to mainly Unsettled levels, and a chance of Active intervals. A further strengthening of the solar wind is then possible day 4 (3rd), with a chance of Minor geomagnetic Storms. There is still a chance of some visible aurora or northern parts of the UK early on the 31st.

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) will continue declining towards background levels through the period, with no further solar radiation storms forecast.

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Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	70	40	10	30
Strong	G3	No	40	5	1	1
Severe	G4	No	5	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	No	20	20	20	20
Very Active	R3 to R5 X	No	5	5	5	5

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	Yes	20	2	2	2
Very Active	≥ S3 *	No	1	1	1	1

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)

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